

CLAIMS

1. A method for manufacturing a thin film, the thin film containing a first thin film material and a second thin film material, in which the thin film is manufactured on a surface to be vapor-deposited by vacuum vapor deposition,
5 wherein the first thin film material and the second thin film material are evaporated by heating using an electron beam heating method and a resistance heating method, respectively, and
10 an electron beam to be used to heat the first thin film material is passed through a vapor stream of the second thin film material.
2. The method according to claim 1, wherein a reactive gas is introduced in a portion on the surface to be vapor-deposited in which the
15 thin film is to be formed.
3. The method according to claim 1, wherein a bias voltage is applied to the surface to be vapor-deposited.
- 20 4. The method according to claim 1, wherein the first thin film material is Co, and the second thin film material is Li.
5. An apparatus for manufacturing a thin film, comprising:
an electron beam evaporation source that is arranged so as to face a
25 surface to be vapor-deposited and contains a first thin film material;
an electron beam source that emits an electron beam to be used to evaporate the first thin film material by heating using an electron beam heating method; and
a resistance heating evaporation source that is arranged so as to
30 face the surface to be vapor-deposited and evaporates a second thin film material by heating using a resistance heating method,
wherein the electron beam evaporation source, the electron beam source and the resistance heating evaporation source are arranged so that the electron beam passes through a vapor stream of the second thin film
35 material.
6. The apparatus according to claim 5, wherein the electron beam

evaporation source, the resistance heating evaporation source and the electron beam source are arranged in this order.

5 7. The apparatus according to claim 5, further comprising a nozzle for introducing a reactive gas in a portion on the surface to be vapor-deposited in which the thin film is to be formed.

10 8. The apparatus according to claim 5, further comprising a bias device for applying a bias voltage to the surface to be vapor-deposited.

9. The apparatus according to claim 5, wherein the electron beam evaporation source, the electron beam source and the resistance heating evaporation source are arranged substantially on the same plane.

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